(No Model.) 5 Sheets—Sheet 1.

J. J. HEILMANN.

ELECTRICAL PROPULSION OF RAILWAY CARS.

No. 519,674. Patented May 8, 1894.

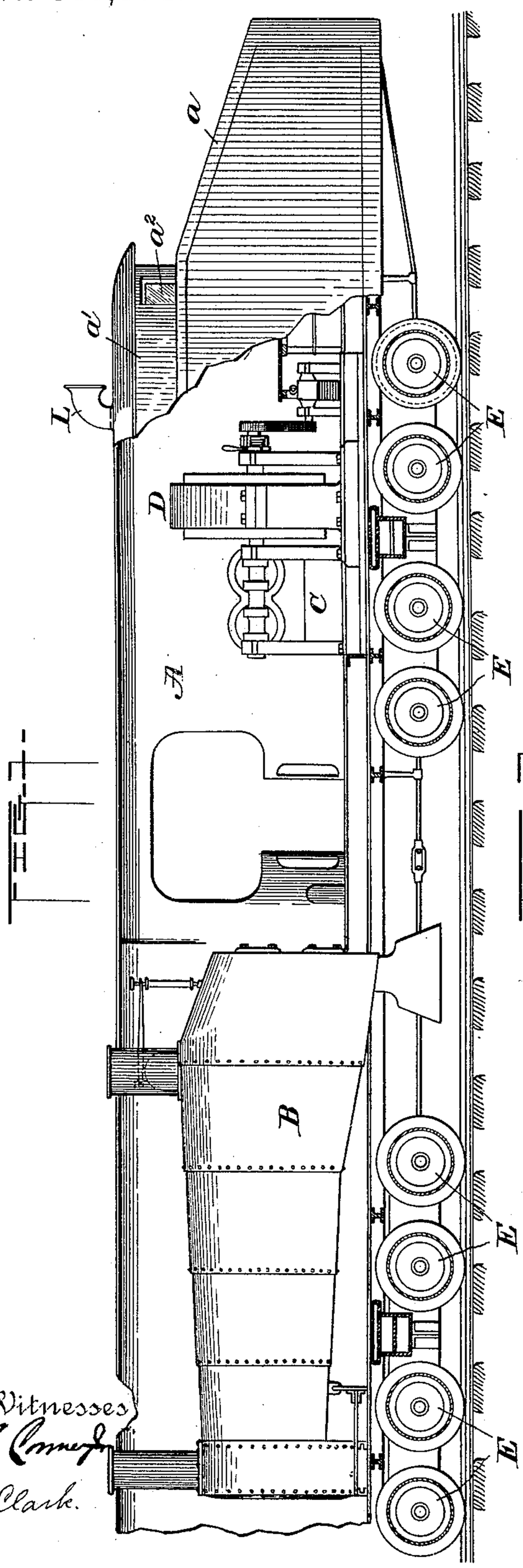

FIG. 1.

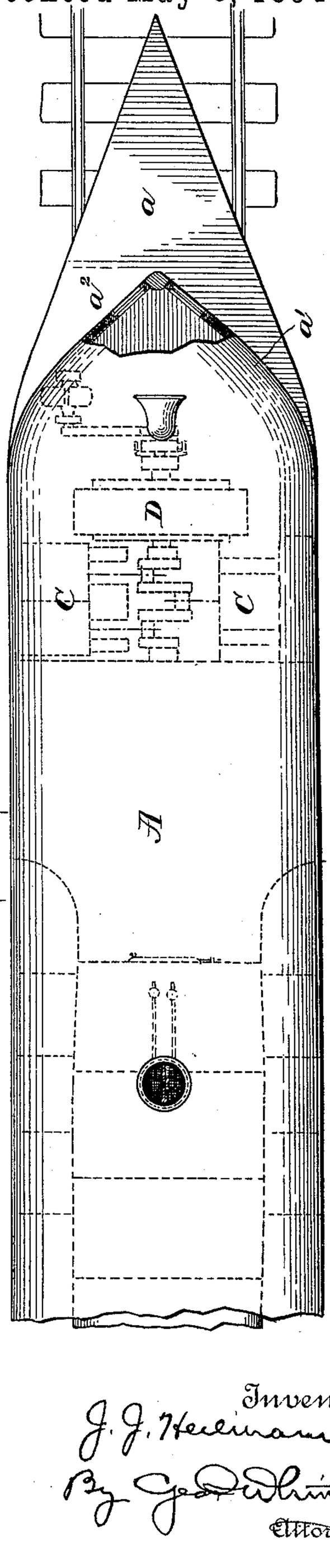

FIG. 2.

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J. J. HEILMANN.

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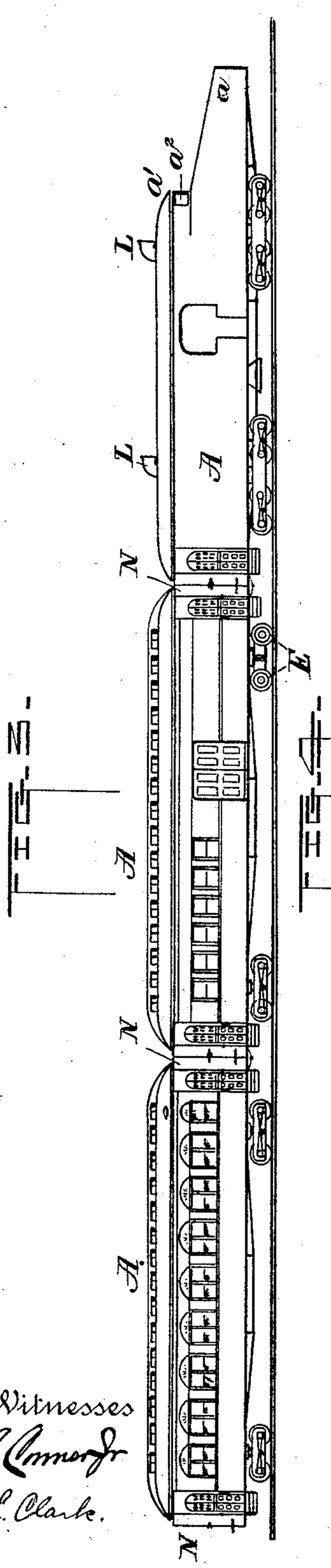
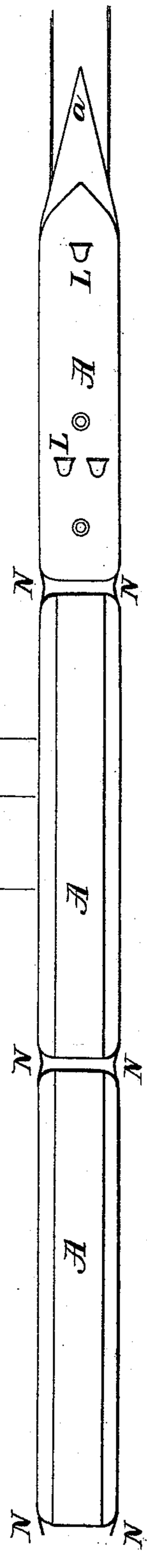


FIG. 2.



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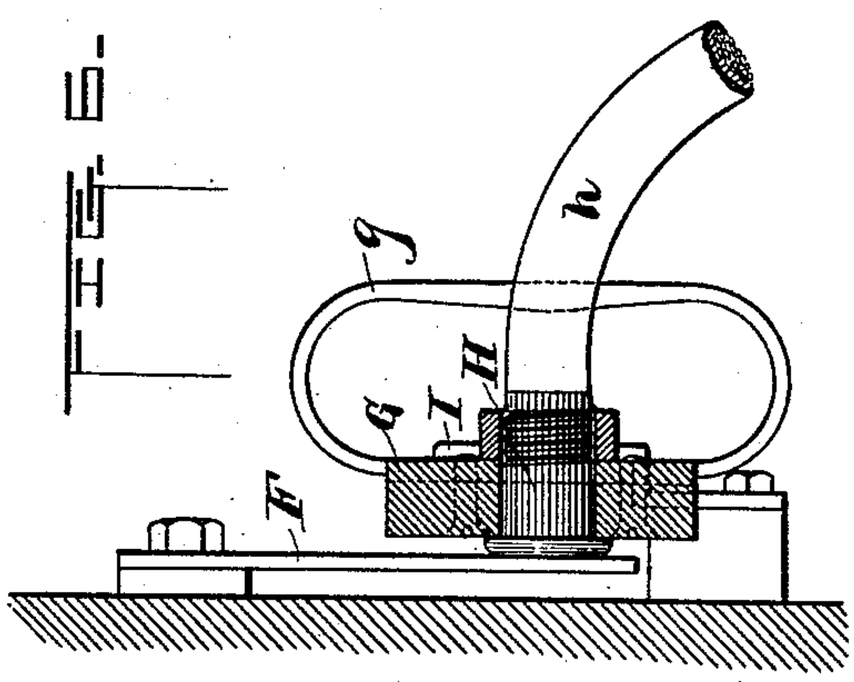

FIG. 6.

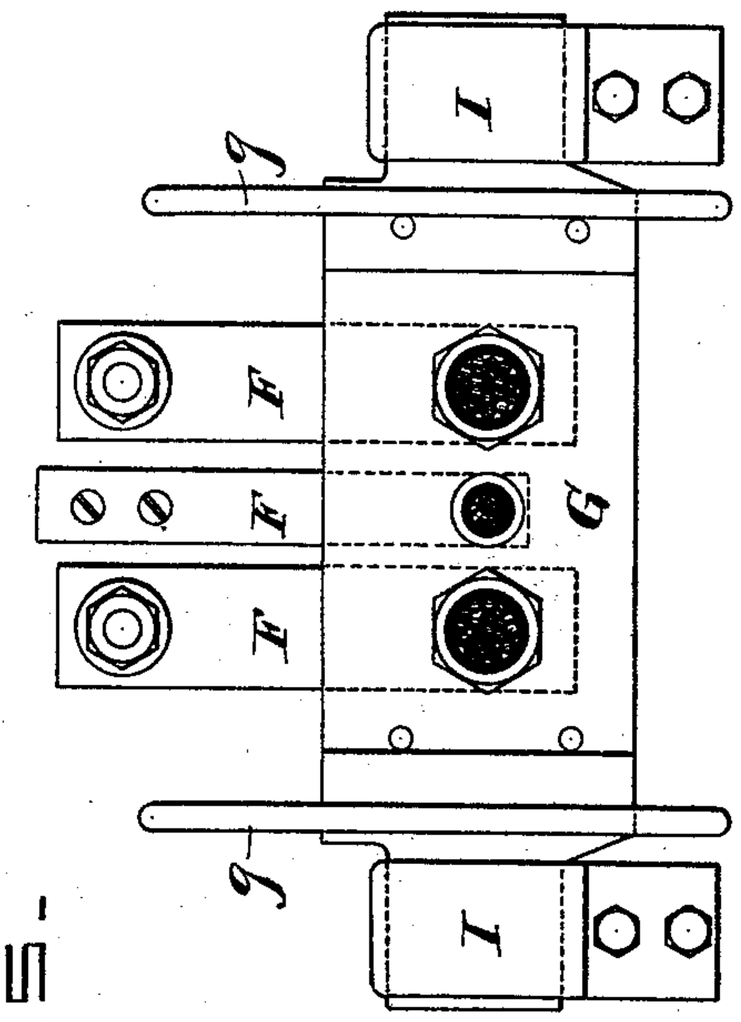

FIG. 5.

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J. J. HEILMANN.

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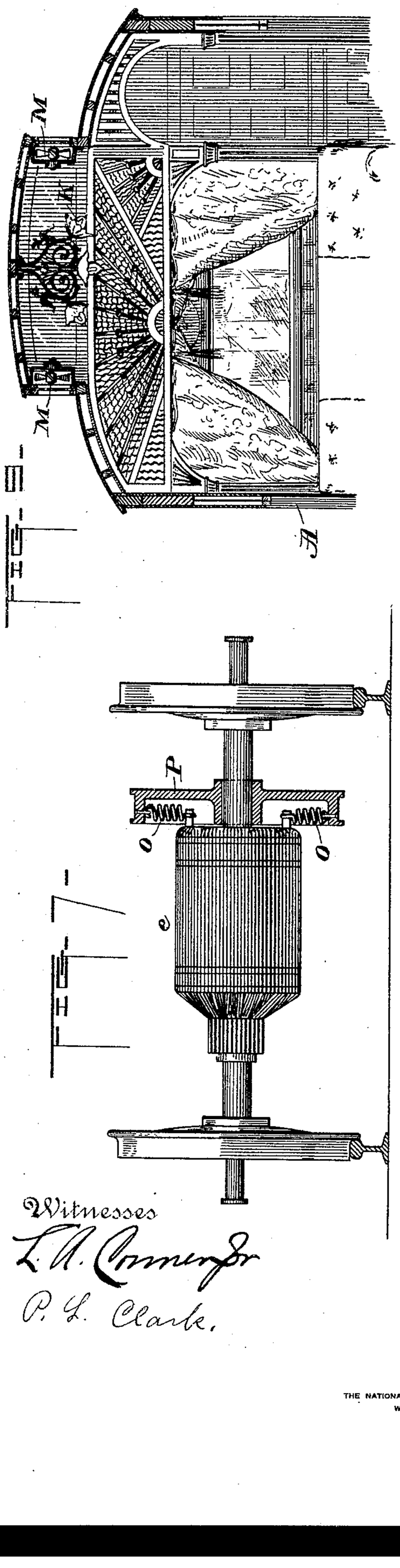
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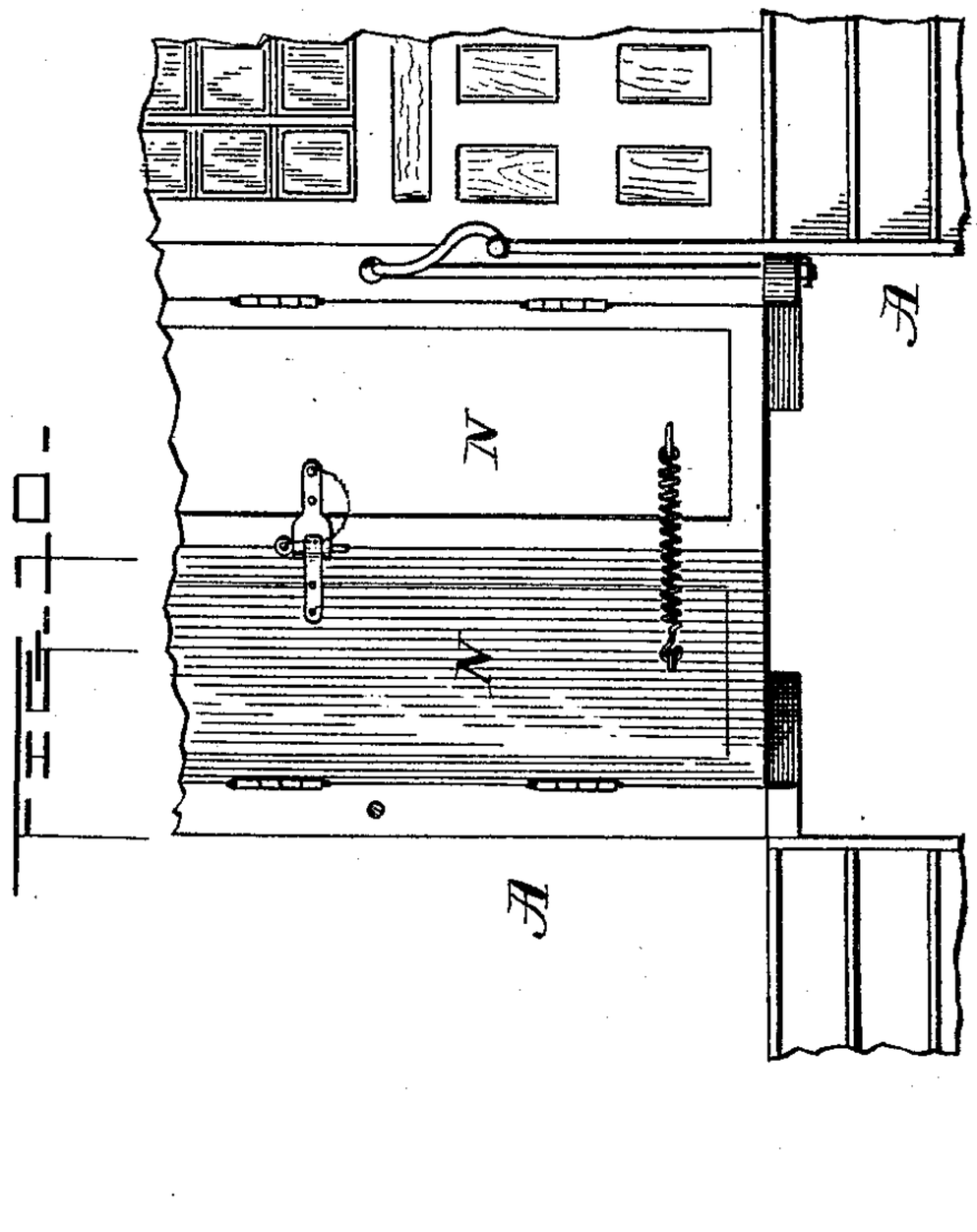

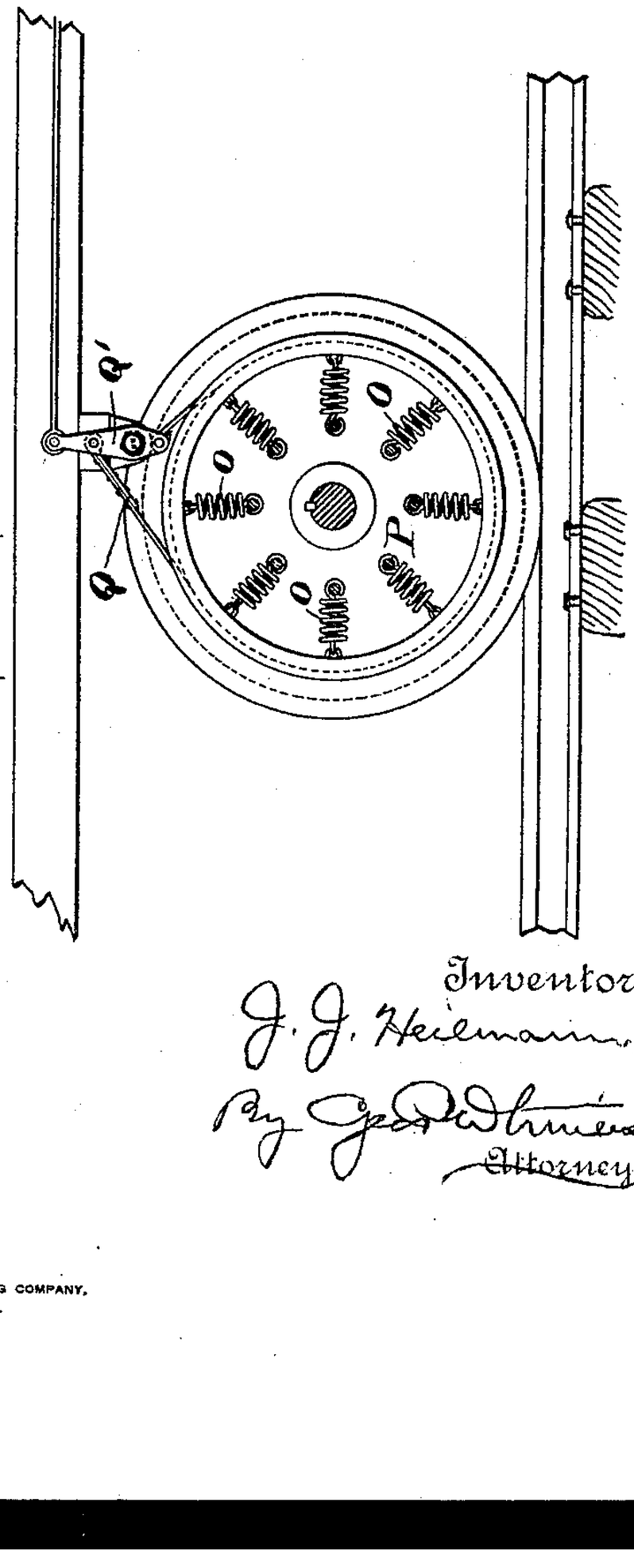

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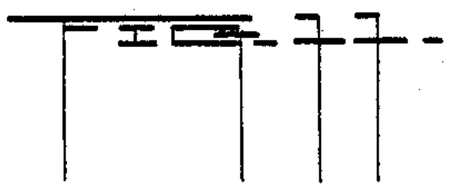


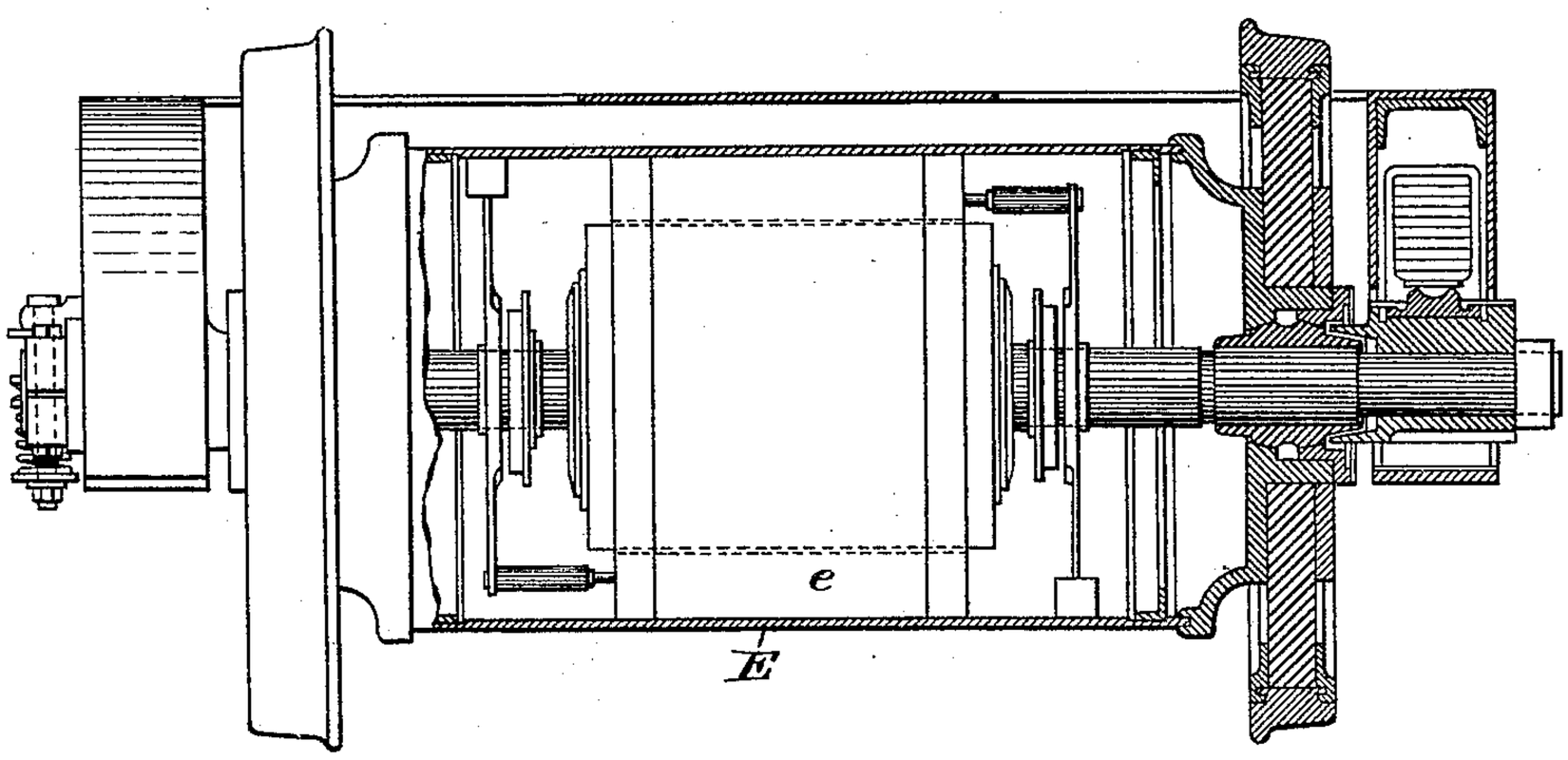
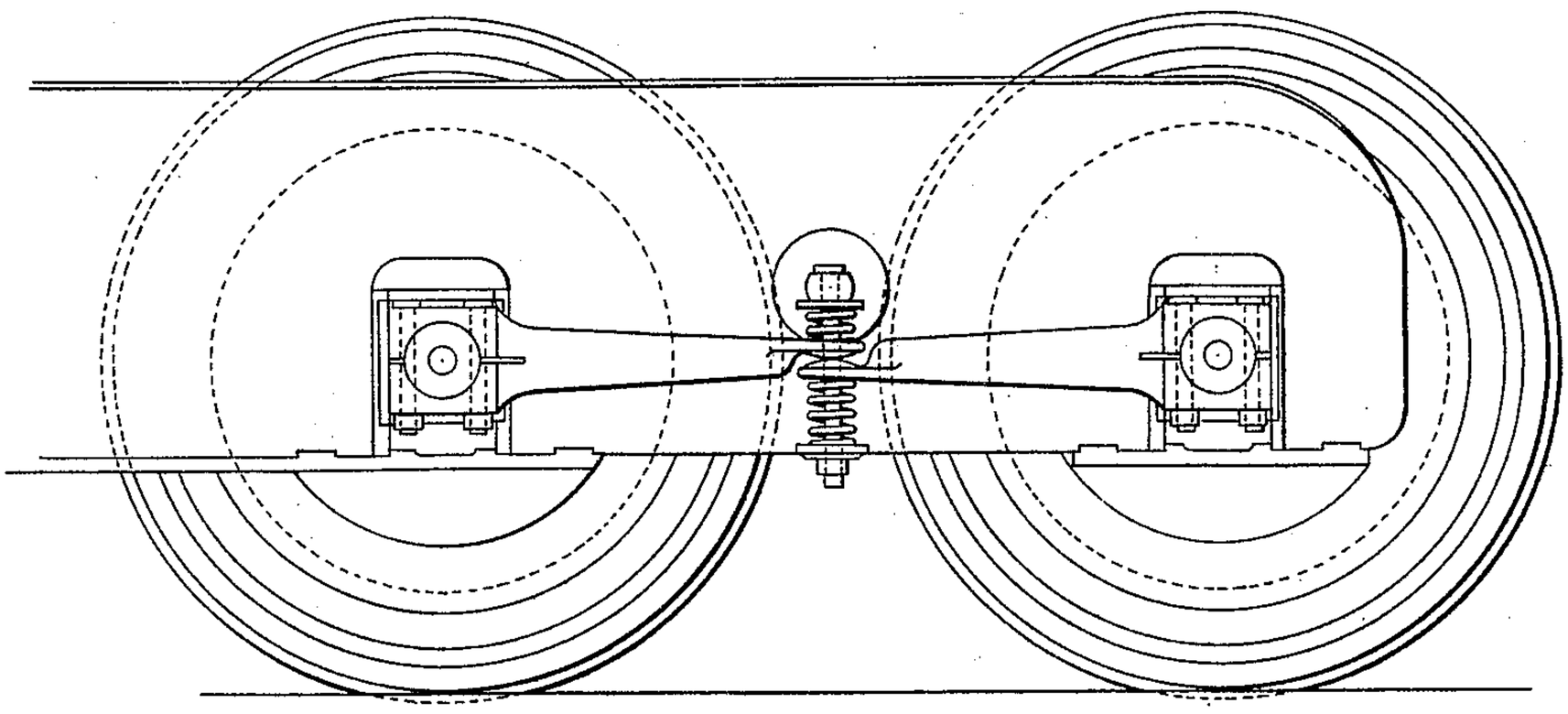


FIG. 12.



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J. J. HEILMANN.

ELECTRICAL PROPULSION OF RAILWAY CARS.

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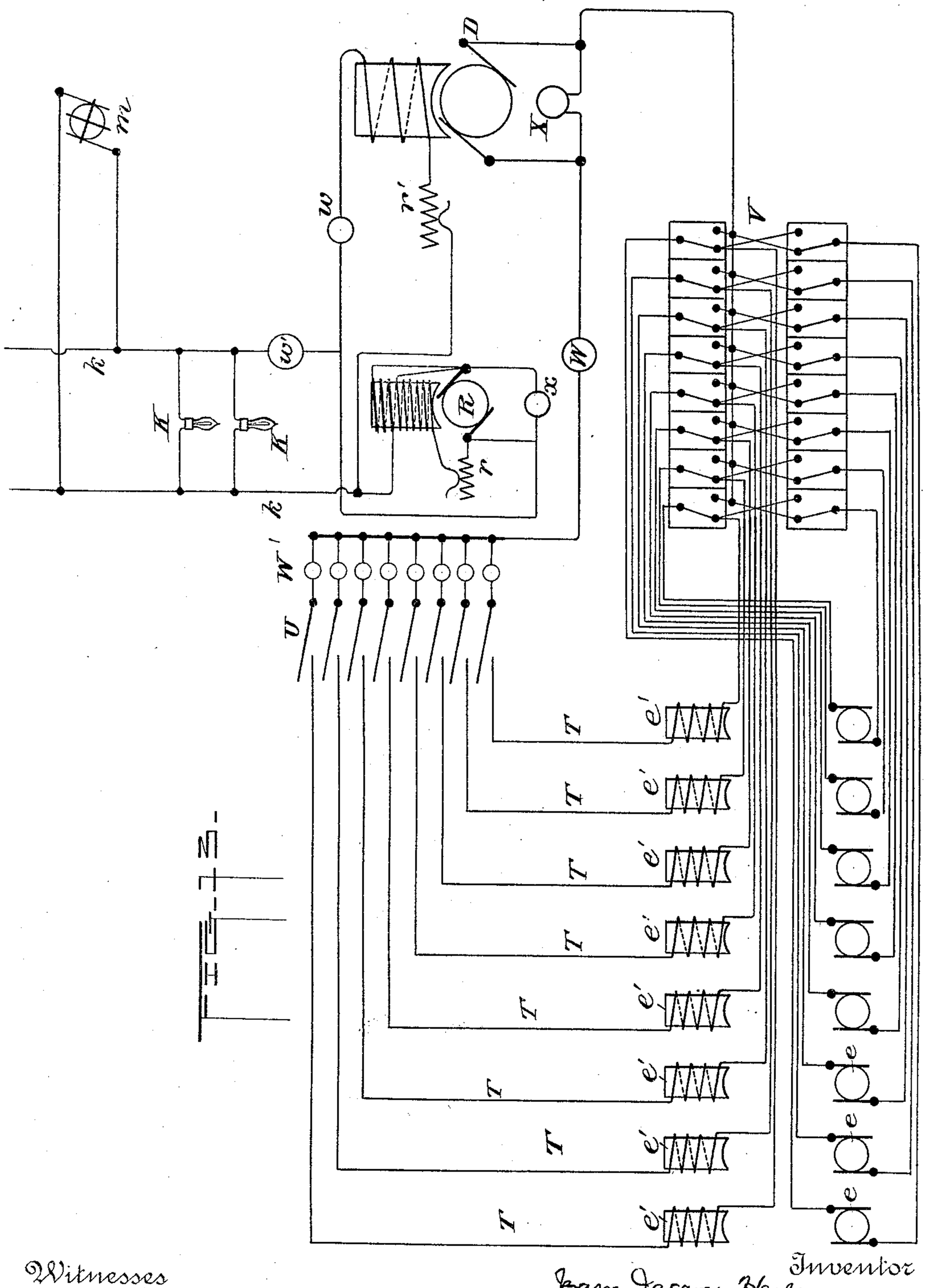

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UNITED STATES PATENT OFFICE.

JEAN JACQUES HEILMANN, OF BELFORT, FRANCE.

ELECTRICAL PROPULSION OF RAILWAY-CARS.

SPECIFICATION forming part of Letters Patent No. 519,674, dated May 8, 1894.

Application filed December 18, 1890. Serial No. 375,161. (No model.)

To all whom it may concern:

Be it known that I, JEAN JACQUES HEILMANN, engineer, a citizen of the Republic of France, and a resident of Belfort, Department of Haut-Rhin, France, have invented new and useful Improvements Connected with the Electrical Propulsion of Vehicles on Railways and Tramways, of which the following is a specification.

This invention relates to the traction or propulsion by means of electricity of carriages, wagons and other vehicles upon railways, tramways and similar permanent roads, and these improvements have for their objects to reduce the weight and cost of the rolling stock, to reduce the wear and tear of the permanent way, of the rolling stock, and particularly of the wheel tires; to insure a more uniform wearing away of the surfaces of the rails and to prevent the scaling, foliation or breaking of the upper edges of the rails, to permit safely an increase of speed and insure an economy of time; to reduce the motive power required for traction by reducing the resistances which at present exist with ordinary steam traction; the suppression of air, vacuum and other brakes, and to enable the vehicle in which the motive power is generated to be placed in any part of the train.

For the purposes of my invention I replace the locomotive or traction engine of ordinary railways and tramways in which the motive power is transmitted directly to the driving wheels of the locomotive, by a vehicle or vehicles on which is mounted a suitable steam engine and boiler. This engine or motor, instead of being employed to rotate the driving wheels is exclusively employed to drive a dynamo or dynamos which is or are carried upon the same vehicle or vehicles or are otherwise suitably arranged with respect to the motor for the purposes of this invention. Upon each of the carriages, wagons or other vehicles constituting a train there is an electric motor or motors arranged to drive one or more of the axles or of the wheels of the vehicles, either directly or through suitable gearing, as usual, or in any suitable and convenient manner. The electric current generated by the dynamo or dynamos is conveyed by properly insulated metallic conductors to the motors of the various vehicles. The circuit which includes the dynamo and the motors includes also the necessary switches and other devices as is well understood for opening and closing the circuit, and a system of resistances or other means for varying the quantity of the current as may be required to accommodate the various amounts of work to be performed by the motors. It will be understood that the quantity of the current may also be varied by including one or more dynamos in the circuit and by other means. The electric current generated by the dynamo or dynamos may also be employed for lighting the train and for ventilating it by means of fans driven by small electro motors. The electric circuit is preferably metallic, but it may if desired, have its return through the wheels, rails and the earth. The vehicle or vehicles on which the electric current is generated, may be placed with perfect safety, and with greater convenience at the tail of the train, thus avoiding any probable annoyance to the passengers from smoke, sparks or steam.

In the accompanying drawings, to which reference is hereinafter made, Figure 1 is an elevation of the vehicle on which the current is generated as hereinbefore described, and which is represented as constructed to be placed at the head instead of the tail of the train. Fig. 2 is a plan of Fig. 1. Fig. 3 is a side elevation of a train equipped with my improvements. Fig. 4 is a plan view of the same. Figs. 5 and 6 are respectively end and side views of the coupling for the conductors, the former being partly in section. Figs. 7 and 8 are end and side views of friction brake. Fig. 9 is a cross section of the upper portion of a car body. Fig. 10 is a side elevation of a portion of the wings between the cars. Fig. 11 is an end view, partly in section, of a motor truck. Fig. 12 is a side view of the same. Fig. 13 is a diagram of circuits.

The cars A composing the train may be of any suitable construction. I prefer to use the common type of car, as shown in Fig. 3, mounted at each end on a bogie or swiveling truck. The front of the first car is formed into a prow *a*, somewhat resembling the cutwater of a vessel. This wedge shaped front end considerably reduces the air resistance. In order that it may not obstruct the outlook,

a clear story a' is provided above the prow a, the sides of which story converge at an angle of about ninety degrees. In this clear story are windows a^2. One of the cars is arranged to carry a boiler B, which supplies steam to a compound engine C, preferably a triple expansion engine. One or more dynamos D are driven by the engine, and the current from the generator is conducted by suitable wires to electric motors E on the trucks. These motors are preferably connected directly to the axles, each axle having its own motor, and the armature e, being concentric with the axle, as shown in Figs. 7 and 11.

Figs. 7 and 8 illustrate an arrangement for securing an easy start. The motor armature is sleeved loosely upon the axle, and is connected by the use of strong radial springs O with a flanged wheel or disk P fixed upon the axle. By this arrangement the armature can acquire a certain angular velocity before moving the axle, which gradually overtakes it, thus facilitating the start.

The simultaneous connection of the several electric conductors between the vehicles may be effected by means of an arrangement of multiple contacts, as shown in Figs. 5 and 6. The conductors on the car body terminate in springs F secured to a convenient part of the end of the vehicle. A plate G of insulating material carries the contact studs H to which are connected the flexible conductors h which bridge the space between the cars. These studs are properly arranged to abut against the springs F, and can rapidly be secured in position by the hooks I on the car body, behind which the plate G is dropped. Handles g are fixed upon the plate for more easily moving and securing it.

Car couplings between the several vehicles are not essential for haulage, but it is preferred to provide them in order to maintain the relative distances of the cars, and to serve for haulage in case the motors on any particular car should break down.

The lighting of the train is effected by the means of electric lamps K deriving their current from the dynamo D, from a special dynamo, or from secondary batteries.

The electrical circuits are shown in Fig. 13. The field magnets of the generator D are energized by the exciter R, which is compound wound, and of constant potential. It is regulated by a rheostat r. The circuit from this dynamo which includes the field magnets of the generator D, is regulated by the rheostat r'. The lighting means k are preferably in a derived circuit from the exciter, as shown, the ventilating fan motors m being in multiple arc with the lamps K. The current from the generator D is conveyed to the field magnets e' of the motors by the conductors T, said motors being in parallel, and each controlled by a switch U, so that any one or more can be put in service. In each motor circuit is included a commutator V which serves to reverse the direction of the current through the armature e, in order to reverse the motor. The several circuits are provided with ammeters W W' w w', and voltmeters X x.

The ventilation of the cars is obtained by means of tubes L with trumpet shaped mouths opening in the direction of the line of travel. Moreover electric fans M may be used. A complete system of ventilation such as that indicated enables the windows to be permanently closed, thereby avoiding the extra air resistance caused at high speed by open windows. To still further lessen the air resistance, the ends of the cars are provided with hinged wings N, which may be secured together so as to inclose the space between the vehicles, and preserve the continuity of the sides of the train. Fig. 10 shows different modes of securing the wings together.

Instead of, or in addition to the ordinary brake shoe, a friction band may be arranged to grip the periphery of the flanged wheel P, and be operated by the lever Q'.

Having thus described my invention, what I claim is—

1. An electric railway car, comprising a body provided at one end with a sharp prow, and at the rear end with rearwardly extending wings, hinged to each side, a bogie truck at each end, electric motors mounted concentrically on the axles of said trucks, and a compound steam engine, one or more dynamos driven thereby, and a steam generator, all inclosed in said car body, said dynamo or dynamos being connected with said motors, substantially as described.

2. The combination with a railway vehicle, having a wedge-shaped prow, with its front edge standing vertically, of a lookout over the prow, protected by glass plates set at an angle of forty five degrees to and upon each side of the vertical plane of the axis of the vehicle, substantially as described.

3. An electrically propelled train consisting of a plurality of vehicles, the ends of which are provided with wings adapted to open outwardly on vertical axes, and when shut to cover the space between the vehicles, and preserve the skin continuity of the train substantially as described.

4. The combination with an electric car carrying a boiler, a compound steam engine, one or more dynamos, and electric motors mounted concentrically on the axles of said car, of one or more trail cars, each having its own motor, hinged wings arranged to close the gap between two cars, and detachable couplings for completing one or more electric circuits from the dynamo to the several cars, substantially as described.

5. The combination with the axle of a motor truck, of a flanged disk fastened thereto, an armature concentrically mounted on the axle, radial springs connecting the armature and the disk, and lying within the flange, and a friction band brake applied to the periphery of the flange, substantially as described.

6. An electric railway train consisting of the combination with a vehicle carrying a compound steam engine, and a dynamo driven by the same, of vehicles provided with electric motors mechanically connected with their axles, electric lights, and electrically operated ventilating fans, separate circuits extending from the dynamo through the train for each kind of translating devices and detachable couplings between the vehicles arranged to simultaneously connect all the circuits, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 11th day of October, 1890.

JEAN JACQUES HEILMANN.

Witnesses:

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ROBT. M. HOOPER.